

Resource File (28 May 2012)

Angle of Vanishing Stability

There is a lot of mystery over what exactly the Angle of Vanishing Stability represents. In short it gives you an idea about the stability of your Yacht. How stiff or tender she will be in a heavy sea.

A vessel is said to be:-

- “stiff” if she strongly resists heeling and
- “tender” if she heels more readily:

Ideally the AVS for vessels should be more than:

Design Category		Length Overall (loa)	
		Under 12 m	Over 12 m
A	Ocean	140 °	130 °
B	Offshore	130 °	120 °
A	Inshore	105 °	95 °

Once capsized, many vessels become stable in the inverted position.

But firstly, what is a GZ curve?

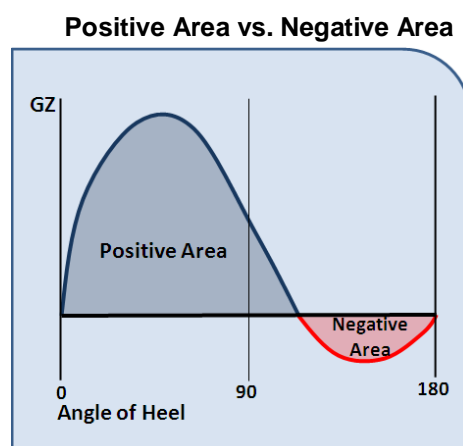
A vessel's GZ curve provides a visual summary of very important information:

- the angle at which the GZ (and RM) is maximum
- angle of vanishing stability (AVS)
- range of positive stability
- the angles between which a vessel will tend to remain inverted - sometimes known as the range of negative or inverted stability

E.g.

The GZ curve for a vessel shows very important information.

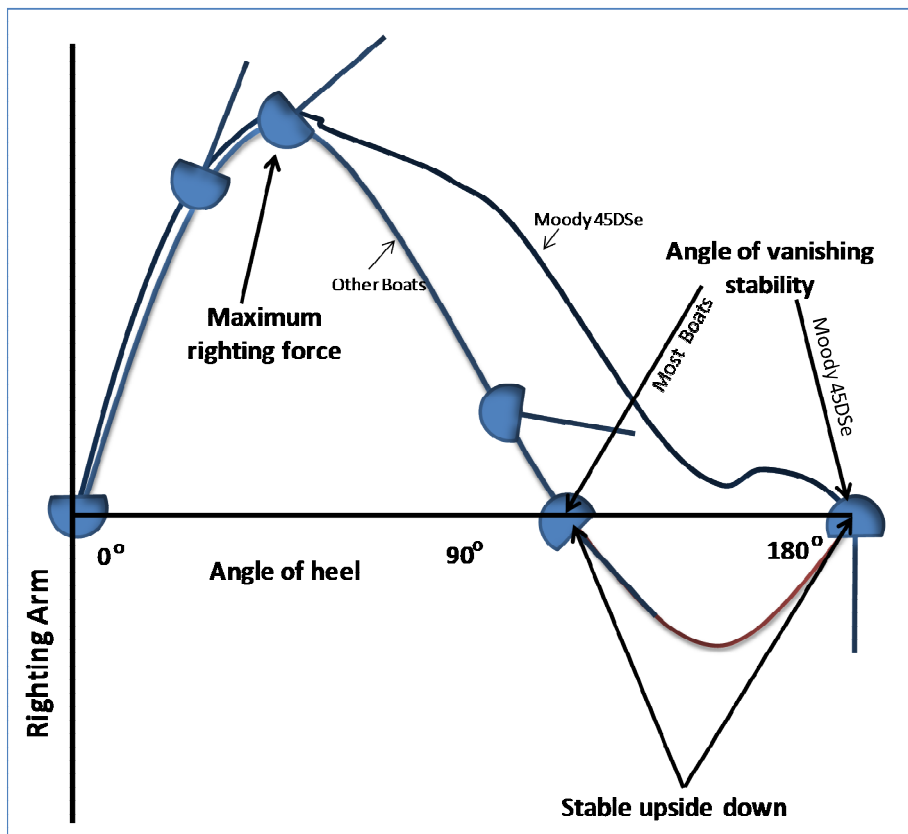
The ration between the areas under the curve gives an important indication of stability:



The larger the ratio, and the smaller the negative area, the more likely a vessel are to right after inversion.

The Angle of Vanishing Stability

As the boat heels more, RM decreases, until RM (righting movement) is zero. The boat can invert!
 Righting moment curve for flat water.



The above diagram tells us that if a boat heels far enough, it becomes stable upside down. The point where this occurs is known as the Angle of Vanishing Stability or AVS. Boats will not normally heel past their AVS. Obviously, the wind could not make this happen, the sails are under water and the only way for this to occur is for the force of the water to push the boat over. A vessel which inverts will remain inverted until a wave rolls it past its angle of vanishing stability, then it will return to the correct orientation. Therefore the higher the AVS is the more stable and resistant to staying inverted it will be. The Moody 45DSe has an AVS of 180°!